

We claim:

1. A network management system for controlling a network of antennas including multiple antennas located on multiple sites, each of the antennas having antenna operating parameters, the system comprising:

a controller remotely located from the multiple sites of the network of antennas for generating an IP address and establishing an IP connection to a data network in communication with the network of antennas and for providing control signals to selected antennas in the network of antennas over said IP connection; and

a user interface coupled to said controller for selecting antennas within the network of antennas and for controlling using said control signals selected antenna operating parameters of said selected antennas.

2. The system of claim 1 wherein said user interface includes:

process control for establishing groups of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within a group.

3. The system of claim 1 wherein said user interface includes:

process control for changing a selected antenna operating parameter for a group of antennas located at a site.

4. The system of claim 1 wherein said user interface includes:

process control for establishing a group of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within the group;

process control for selecting an antenna operating parameter to be changed by

said controller; and

process control for automatically scheduling execution of said antenna operating parameter changes for the antennas in the group of antennas.

5. The system of claim 1 and further including a local area network interconnecting said controller and said user interface.

6. The system of claim 1 wherein said user interface includes a graphic display for displaying a representation of the network of antennas.

7. The system of claim 1 wherein said user interface includes a graphic display for displaying selected antenna operating parameters of selected antennas within the network of antennas.

8. The system of claim 1 wherein said user interface includes a graphic display for displaying antenna operating parameters of antennas at selected sites within the network of antennas.

• 9. The system of claim 1 wherein said user interface includes a graphic display for displaying user selected groups of antennas within the network of antennas.

10. The system of claim 1 wherein said user interface includes a graphic display for displaying user selected antenna operating parameters for selected groups of antennas within the network of antennas.

11. The system of claim 1 wherein said user interface includes a graphic display for displaying user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

12. The system of claim 1 wherein said user interface includes:

- a first graphic display for displaying a representation of the network of antennas;
- a second graphic display for displaying selected antenna operating parameters of selected antennas within the network of antennas;
- a third graphic display for displaying antenna operating parameters of antennas at selected sites within the network of antennas;
- a fourth graphic display for displaying user selected groups of antennas within the network of antennas;
- a fifth graphic display for displaying user selected antenna operating parameters for selected groups of antennas within the network of antennas; and
- a sixth graphic display for displaying user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

13. A base station telecommunications system comprising:

- a plurality of antenna sites;
- a plurality of antennas located at each of said plurality of antenna sites, each of said plurality of antennas having antenna operating parameters;
- a data network in communication with said plurality of antenna sites;
- a processor remotely located from said plurality of antenna sites for generating an IP address and establishing an IP connection to said data network for providing processor generated control signals to selected antennas over said IP connection for changing said antenna operating parameters; and
- a user interface coupled to said processor for selecting antennas and selecting antenna operating parameters of said selected antennas to be changed.

14. The system of claim 13 wherein said antenna operating parameters are selected from the group consisting of elevation beam tilt, azimuth beam width, azimuth beam pointing, elevation beam width, azimuth beam shape and elevation beam shape.

15. The system of claim 13 wherein said user interface includes:

- process control for establishing groups of antennas for simultaneously changing antenna operating parameters of all antennas within a group.

16. The system of claim 13 wherein said user interface includes:

- process control for changing a selected antenna operating parameter for a group of antennas located at a site.

17. The system of claim 13 wherein said user interface includes:

- process control for establishing a group of antennas for simultaneously changing

antenna operating parameters of all antennas within the group;

process control for selecting an antenna operating parameter to be changed by said processor; and

process control for automatically scheduling execution of said antenna operating parameter change for the antennas in the group of antennas.

18. The system of claim 13 and further including a local area network interconnecting said processor and said user interface.

19. The system of claim 18 wherein said user interface includes a plurality of user interfaces for allowing multiple users access to said local area network.

20. The system of claim 13 wherein said user interface includes:
a first graphic display for displaying a representation of the network of antennas;
a second graphic display for displaying selected antenna operating parameters of selected antennas within the network of antennas;

a third graphic display for displaying antenna operating parameters of antennas at selected sites within the network of antennas;

a fourth graphic display for displaying user selected groups of antennas within the network of antennas;

a fifth graphic display for displaying user selected antenna operating parameters for selected groups of antennas within the network of antennas; and

a sixth graphic display for displaying user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

21. The system of claim 13 wherein said processor generating control signals for controlling antenna equipment located at said antenna sites.

22. A method for controlling a network of antennas including multiple antennas located on multiple sites, each of the antennas having operating parameters, the method comprising:

generating using a controller remotely located from the multiple sites of the network of antennas an IP address and establishing an IP connection to a data network in communication with the network of antennas and providing control signals to selected antennas in the network of antennas over the IP connection; and

selecting antennas within the network of antennas using an interface coupled to the controller for controlling selected antenna operating parameters of the selected antennas by the control signals.

23. The method of claim 22 and further including:

establishing groups of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within a group.

24. The method of claim 22 and further including:

changing a selected antenna operating parameter for a group of antennas located at a site.

25. The method of claim 22 and further including:

establishing a group of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within the group;

selecting an antenna operating parameter to be changed by the controller; and

automatically scheduling execution of the antenna operating parameter changes for the antennas in the group of antennas.

26. The method of claim 22 and further providing a local area network interconnecting the controller and the interface.

27. The method of claim 22 and further including:

displaying a representation of the network of antennas on a display.

28. The method of claim 22 and further including:

displaying selected antenna operating parameters of selected antennas within the network of antennas on a display.

29. The method of claim 22 and further including:

displaying antenna operating parameters of antennas at selected sites within the network of antennas on a display.

30. The method of claim 22 and further including:

displaying user selected groups of antennas within the network of antennas on a display.

31. The method of claim 22 and further including:

displaying user selected antenna operating parameters for selected groups of antennas within the network of antennas on a display.

32. The method of claim 22 and further including:

displaying user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas on a display.

33. The method of claim 22 and further including:

- displaying on a display a representation of the network of antennas;
- displaying on the display selected antenna operating parameters of selected antennas within the network of antennas;
- displaying on the display antenna operating parameters of antennas at selected sites within the network of antennas;
- displaying on the display user selected groups of antennas within the network of antennas;
- displaying on the display user selected antenna operating parameters for selected groups of antennas within the network of antennas; and
- displaying on the display user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

34. A method for controlling base station telecommunications comprising:

- providing a plurality of antenna sites;
- providing a plurality of antennas located at each of the plurality of antenna sites, each of the plurality of antennas having antenna operating parameters;
- connecting a data network to the plurality of antenna sites;
- generating using a processor remotely located from the plurality of antenna sites an IP address and establishing an IP connection to the data network for providing processor generated control signals to selected antennas over the IP connection for changing the antenna operating parameters; and
- selecting antennas and selecting antenna operating parameters of the selected antennas to be changed using an interface coupled to the processor.

35. The method of claim 34 wherein the antenna operating parameters are selected from the group consisting of elevation beam tilt, azimuth beam width, azimuth beam pointing, elevation beam width, azimuth beam shape and elevation beam shape.

36. The method of claim 34 and further including:

- establishing groups of antennas for simultaneously changing antenna operating parameters of all antennas within a group.

37. The method of claim 34 and further including:

- changing a selected antenna operating parameter for a group of antennas located at a site.

38. The method of claim 34 and further including:

- establishing a group of antennas for simultaneously changing antenna operating

parameters of all antennas within the group;

selecting an antenna operating parameter to be changed by the processor; and

scheduling execution of the antenna operator parameter change for the antennas in the group of antennas.

39. The method of claim 34 and further providing a local area network interconnecting the processor and the user interface.

40. The method of claim 34 further including:

allowing multiple users access to said local area network.

41. The method of claim 34 and further including:

displaying on a display a representation of the network of antennas;

displaying on the display selected antenna operating parameters of selected antennas within the network of antennas;

displaying on a display antenna operating parameters of antennas at selected sites within the network of antennas;

displaying on the display user selected groups of antennas within the network of antennas;

displaying on the display user selected antenna operating parameters for selected groups of antennas within the network of antennas; and

displaying on the display user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

42. The method of claim 34 and further including:

controlling antenna equipment located at the antenna sites using the control signals.

43. A wireless network management system for controlling a network including multiple antennas and equipment located on multiple sites, each of the antennas having antenna operating parameters, the system comprising:

a controller remotely located from the multiple sites for generating an IP address and establishing an IP connection to a data network in communication with the sites and for providing control signals to selected antennas and equipment over said IP connection;

a user interface coupled to said controller for selecting antennas and for controlling using said control signals selected antenna operating parameters of said selected antennas; and

process control for optimizing operation of the network based upon antenna operating parameters and network performance.

44. The system of claim 43 wherein said user interface includes:

process control for establishing groups of antennas for simultaneously changing antenna operating parameters of all antennas within a group.

45. The system of claim 43 wherein said user interface includes:

process control for changing a selected antenna operating parameter for a group of antennas located at a site.

46. The system of claim 43 wherein said user interface includes:

process control for establishing a group of antennas for simultaneously changing antenna operating parameters of all antennas within the group;

process control for selecting an antenna operating parameter to be changed by

said controller; and

process control for automatically scheduling execution of said antenna operating parameter changes for the antennas in the group of antennas.

47. The system of claim 43 and further including a local area network interconnecting said controller and said user interface.

48. The system of claim 43 wherein said user interface includes a graphic display for displaying a representation of the network of antennas.

49. The system of claim 43 wherein said process control for optimizing network operation includes a prestored database of antenna operating parameters for use by said controller for generating said control signals.

50. The system of claim 43 wherein said process control for optimizing network operation includes process control for monitoring the network in real time and providing said controller antenna operating parameters in real time to said controller.

51. The system of claim 43 wherein said user interface includes:

- a first graphic display for displaying a representation of the network of antennas;
- a second graphic display for displaying selected antenna operating parameters of selected antennas within the network of antennas;
- a third graphic display for displaying antenna operating parameters of antennas at selected sites within the network of antennas;
- a fourth graphic display for displaying user selected groups of antennas within the network of antennas;

a fifth graphic display for displaying user selected antenna operating parameters for selected groups of antennas within the network of antennas; and

a sixth graphic display for displaying user created schedules for controlling selected antenna operating parameters of selected antennas within the network of antennas.

52. A method for controlling a wireless network including multiple antennas and equipment located on multiple sites, each of the antennas having operating parameters, the method comprising:

generating using a controller remotely located from the multiple sites an IP address and establishing an IP connection to a data network in communication with the sites and providing control signals to selected antennas and equipment over the IP connection; and

selecting antennas using an interface coupled to the controller for controlling selected antenna operating parameters of the selected antennas by the control signals; and

optimizing operation of the network based upon antenna operating parameters and network performance.

53. The method of claim 52 and further including:

establishing groups of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within a group.

54. The method of claim 52 and further including:

changing a selected antenna operating parameter for a group of antennas located at a site.

55. The method of claim 52 and further including:

establishing a group of antennas in the antenna network for simultaneously changing antenna operating parameters of all antennas within the group;

selecting an antenna operating parameter to be changed by the controller; and

automatically scheduling execution of the antenna operating parameter changes for the antennas in the group of antennas.

56. The method of claim 52 and further providing a local area network interconnecting the controller and the interface.

57. The method of claim 52 and further including:
displaying a representation of the network of antennas on a display.

58. The method of claim 52 wherein optimizing operation of the network utilizes a prestored database of antenna operating parameters based upon calculated network operating parameters.

59. The method of claim 52 wherein optimizing operation of the network occurs in real time.

60. The method of claim 52 and further including:
displaying on a display a representation of the network of antennas;
displaying on the display selected antenna operating parameters of selected antennas within the network of antennas;
displaying on the display antenna operating parameters of antennas at selected sites within the network of antennas;
displaying on the display user selected groups of antennas within the network of antennas;
displaying on the display user selected antenna operating parameters for selected groups of antennas within the network of antennas; and

displaying on the display user created schedules for controlling selected antenna
operating parameters of selected antennas within the network of antennas.